

**REMARKS**

Applicants now note the indication of allowable subject matter in the present application, specifically, Claims 7, 8, 14, 15, 19, 20, and 23-25. Now in the application are Claims 1-17 and 19-38 of which Claims 1, 30, and 35 are independent. Applicants contend that Claims 1-17 and 19-38 are patentable and in condition for allowance as discussed below.

**Claim Rejections under 35 U.S.C. § 103**

The Office Action rejects Claims 1, 21, 22, 26, and 27 as being unpatentable over U.S. Patent No. 6, 542,846 of Miller *et al.* (hereinafter “Miller”) in view of U.S. Publication No. 2001\0021217 (hereinafter “Gunther”) and in view of U.S. Patent No. 5, 406, 630 of Piosenka *et al.* (hereinafter “Piosenka”). Applicants respectfully traverse each of these rejections on the basis of the following arguments and further contend that neither Miller nor Gunther nor Piosenka, alone or any combination, teach or suggest all elements of these claims, as described below, and hence, does not detract from the patentability of these claims.

For purposes of clarity in the discussion below, the respective claim sets rejected under 35 U.S.C. § 103 are discussed separately.

A. Rejection of Claims 1, 21, 22, 26, and 27 under 35 U.S.C. §103(a):

The Office Action rejects Claims 1, 21, 22, 26, and 27 as being unpatentable over Miller in view of Gunther and in further view of Piosenka. Applicants respectfully traverse this rejection on the basis of the following arguments, and further contend that neither Miller, nor Gunther, nor Piosenka, fail to establish a *prima facie* case of obviousness, as described below, and hence does not detract from the patentability of the claimed invention.

Claims 21, 22, 26, and 27 depend from Claim 1, and thereby incorporate the patentable features of Claim 1.

The invention as recited in Claim 1 relates to a controller for monitoring a temperature of an integrated circuit. The controller of the claimed invention includes a first interface, a second interface, a comparator, and comparator response logic coupled to the comparator. The first interface receives a first value representative of a temperature of the integrated circuit. The first value is produced by one of an active thermal sensor and a passive thermal sensor formed in the

integrated circuit. The second interface receives a second value representative of a threshold temperature for the integrated circuit. A comparator compares the first value to the second value and the comparator response logic coupled to the comparator determines in response to the comparison of the first value to the second value by the comparator whether an over temperature exists in the integrated circuit.

The cited Gunther patent is concerned with an integrated on-chip thermal management system providing closed-loop temperature control of an integrated circuit device. Gunther describes a thermal sensor that includes a programmable voltage source and a reference voltage source, both of which are powered by a current source. The thermal sensor of Gunther further includes a comparator, also powered by the current source. A transmission medium couples the programmable voltage source to the comparator and similarly, a transmission medium couples the reference voltage source to the comparator, which includes an output. The reference voltage source of the thermal sensor provides a relatively constant voltage to the comparator over a temperature range of interest. The programmable voltage source of the thermal sensor generates a voltage value dependent upon the temperature of the die area in the vicinity of the thermal sensor. The comparator of the thermal sensor compares the voltage value from the programmable voltage source against the voltage value from the reference voltage source and, if the programmable voltage value equals or exceeds the reference voltage value, the comparator provides a high logic level (i.e., a logical 1) on its output; otherwise, the comparator provides a low logic level (i.e., a logical 0) on its output.

The cited Miller patent describes a thermal management system for a portable ultrasound imaging device. The thermal management system of Miller includes a number of temperature sensors, preferably thermistors to monitor respective temperatures of the components forming the portable ultrasound imaging device. A thermal management controller periodically polls the temperature sensors during operation of the ultrasound system according to a software polling routine stored in the thermal management controller. The thermal management system of Miller monitors the respective temperatures of various system components, for example, a battery, a fan, a package surface of an integrated circuit, and, based on the monitored temperatures, performs control to cool the ultrasound system to maintain an external casing temperature below safety regulated temperatures. In this manner, a patients' safety is maintained so that the external surface temperature of the imaging device does not exceed 50°C.

The cited Piosenka patent relates to a tamper proof arrangement for an integrated circuit. In particular, the cited integrated circuit configuration includes two or more temperature sensors coupled to respective comparator circuits, which, in turn are coupled to an energy storage device. The energy storage device has a small amount of power so that upon the detection of an attack on or tampering with the integrated circuit, the stored power is applied to all memory elements to clear or zeroize any sensitive information to prevent the disclosure of such data. *See*, column 5, line 54-58 of Piosenka. If an alarm output is generated by any of the comparator circuits, the alarm output is transmitted to the energy storage device. In turn, the energy storage device then clears or zeroize all the critical or sensitive information included within a selected function area. As a result, the cited integrated circuit is protected from any kind of attack which would be accomplished via radiation or which would generate heat over and above the normal operating temperature of the integrated circuit. *See*, column 6, lines 25-35 of Piosenka.

The cited patents, alone or in any combination do not detract from the patent ability of Claim 1. The Miller patent teaches a thermal management system for a portable battery powered electronic device to control the temperature of the device to prevent the external surface temperature of the device from exceeding a temperature defined by certain medical safety regulation requirements. The Miller patent teaches the use of thermistors or passive thermal sensors to perform a temperature measurement of the various units that form the portable battery powered electronic device. As recognized by the Examiner, the Miller patent does not teach or suggest an *active* thermal sensor formed in an integrated circuit to produce a first value representative of a temperature of the integrated circuit, as recited in Claim 1. Furthermore, as recognized by the Examiner, the Miller patent does not teach or suggest a comparator response logic coupled to a comparator for determining in response to a comparison of the first value to a second value by the comparator whether an over temperature condition in the integrated circuit exists, as recited in Claim 1.

The Examiner looks to the Gunther reference to overcome one of the deficiencies of the Miller patent. That is, the Examiner cites the Gunther reference for teaching or suggesting an active thermal sensor formed in an integrated circuit to produce a first value. However, the Gunther reference teaches active thermal sensor that requires a structure that includes a comparator to determine if the die temperature in the vicinity of the thermal sensor exceeds a threshold value. Placement of a comparator in a thermal sensor consumes a significant amount

of die area as compared to a thermal sensor free of a comparator to determine if the die temperature in the vicinity of the thermal sensor exceeds a threshold value. Accordingly, placement of the comparator outside of the thermal sensor, for example, in a controller minimizes the die area required by a thermal sensor formed in an integrated circuit, especially if multiple thermal sensors are formed in the die. Moreover, placement of a comparator outside the thermal sensor further minimizes self-heating effects in the die contributable to the thermal sensor which can elevate a sensed die temperature value in the vicinity of the thermal sensor and, in turn, detract from the sensors measurement accuracy. Hence, the Gunther reference teaches a thermal sensor having a structure and a function and an operation different from the active thermal sensor recited in Claim 1. Moreover, because Gunther reference teaches a thermal sensor having a structure and a function and an operation different the thermal sensors of the Miller patent thus requiring a substantial redesign and reconstruction of the controller taught by Miller to operate and function in conjunction with the thermal sensor taught by Gunther.

Specifically, the Miller patent teaches a controller that requires polling of various temperature sensors according to a software polling routine to read a temperature sensed by a temperature sensor. *See*, Column 4, lines 36-42 of Miller. The temperature sensor of Miller sends an analog temperature value to the controller in response to the polling. In contrast to Miller, the thermal sensors taught by Gunther are event driven devices and are not responsive to a polling request. That is, the thermal sensors of Gunther automatically report an over temperature event and hence an output of a thermal sensor taught by Gunther operates and functions as an interrupt. Moreover, the output of the thermal sensor taught by Gunter is digital having only one bit and two possible states. Furthermore, the controller of Miller performs the comparison of the polled temperature value to the reference value to determine an over temperature condition while the thermal sensor of Gunther performs the comparison of the temperature value to the reference value to determine the over temperature condition. Hence, either the controller taught by Miller or the thermal sensor taught by Gunter would require substantial redesign and reconstruction to allow one to operate with the other.

To cure the second deficiency in the teaching of the Miller patent Examiner cites the Piosenka reference to teach or suggest a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by the comparator whether an over temperature condition in the integrated circuit exists. The Piosenka patent

describes a comparator that determines whether an alarm condition exists. The Piosenka patent does not teach or suggest a comparator response logic coupled to a comparator for determining whether an alarm condition exists in the tamper proof integrated circuit. A careful reading of the passages cited in the Piosenka patent by the Examiner in support of a teaching of a comparator response logic fail to teach or suggest such a feature. That is, each comparator circuit 105 and 106 of the Piosenka patent is coupled to an energy storage source and the energy source in response to an alarm output by each comparator to discharge the stored energy. The structure, function, and operation of the energy storage source holds a small amount of energy so that upon the detection of an attack on the integrated circuit, this stored energy is applied to all memory elements to clear or zeroize them to prevent the disclosure of sensitive information. The energy storage device of Piosenka has a structure and a function and an operation distinct from the comparator response logic recited in Claim 1.

Applicants claimed invention, in contrast to Miller, Gunther and Piosenka recite a controller for monitoring a temperature of an integrated circuit that includes amongst other features, comparator response logic coupled to a comparator for determining in response to comparison of a first value to a second value by the comparator, whether an over temperature condition in the integrated circuit exists. The Miller patent, the Gunther patent, and the Piosenka patent all lack any teaching or suggestion of a comparator response logic as recited in Claim 1. Hence, the cited references alone or in any combination do not teach or suggest each and every element of Claim 1.

Moreover, Applicants submit that the Examiner's piecemeal recitation and application of the Miller patent, the Gunther patent, and the Piosenka patent is inappropriate. Applicants assert that it is impermissible for the Examiner to use the claimed invention as a "template" to piece together the disparate teachings of the cited references to build an argument for obviousness of the claimed subject matter. Indeed, it is well settled that to combine references to establish obviousness, one must show some objective teaching in the art of record that would motivate one of ordinary skill to combine the references or a knowledge available to one of the ordinary skill that suggests combining the references. The cited art fails to meet these tests; the cited art lacks facts that suggest combining the references to render obvious Applicants' claimed invention, and the Examiner asserts no such teachings.

To establish a *prima facie* case of obviousness is to present evidence from the prior art that would lead one of ordinary skill in the art to combine the prior art teachings in the proposed manner to obtain the claimed invention. It is not proper to combine prior art teachings where the only incentive to do so is derived from Applicants disclosure.

The Examiner provides no evidence, and fails to identify prior art teachings that would motivate one of ordinary skill to combine the references in the manner proposed by the Examiner. Rather, the Examiner simply submits as evidence of motivation unsupported statements located on pages 3 and 4 of the Office Action, that one of ordinary skill would include the teaching of the Gunther reference in the system of the Miller patent to actively monitor the die temperature across the integrated circuit. Notwithstanding this statement, Applicants respectively disagree with the proposed combination. The system of Miller is not concerned with an internal die temperature of an integrated circuit. The system of Miller is concerned maintaining a surface temperature of an ultrasound probe below a governmental regulated temperature to avoid damaging the skin of a patient. The internal die temperature of the integrated circuit would be of little, if any value, to the system of Miller for the die temperature is not an accurate representation of an external temperature of a plastic or ceramic package that encapsulates the die. Furthermore, with respect to the Piosenka patent the Examiner simply submits as evidence of motivation to further add the Piosenka to the combination of the Miller patent and the Gunther reference, that one of ordinary skill would be compelled to combine the references “in order to provide a lower cost and efficient mechanism for judging the existence of an over temperature condition in an integrated circuit. Nevertheless, the Piosenka patent is concerned with building a tamper proof integrated circuit to avoid having sensitive data removed from the integrated circuit through physical alteration of the integrated circuit.

Even assuming *arguendo* that the teachings of the references are properly combinable one would still not be able to construct the claimed invention. The thermal sensor of the Gunther patent is not compatible with the controller of the Miller patent for the controller of the Miller patent must read an analog temperature value in order to compare the read temperature value to a threshold temperature value. The thermal sensor of Gunther provides an over temperature event. The thermal sensor does not provide an analog temperature value. In fact, use of the thermal sensor taught by the Gunther reference avoids the need for a controller having a structure, operation, and function taught by the Miller patent. That is, the Gunther reference teaches a self-

contained thermal sensor to make an over temperature determination without the use of a controller external to the thermal sensor. Moreover, neither the Miller patent nor the Gunther reference would benefit from the use of the energy source taught by the Piosenka patent used to destroy data. That is, the purpose of the Miller patent is to avoid damage to the skin of a patient, the purpose of Gunther is to avoid the destruction of data, and the purpose of Piosenka is to destroy data. Clearly, even combined these modified systems do not render obvious the claimed invention.

The prior art does not teach or suggest the claimed controller for monitoring a temperature of an integrated circuit. Furthermore, because there is no motivation in any of the references for one of ordinary skill in the art to use the controller taught by Miller in combination with the thermal sensor taught by Gunther in combination with the power storage device taught by Piosenka, Applicants submit that the combination of references is in error. Therefore the claimed controller for monitoring a temperature of an integrated circuit is patentable over the Miller patent and the Gunther reference and the Piosenka patent.

Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Claims 1, 21, 22, 26, and 27 under 35 U.S.C. §103(a).

B. Rejection of Claims 2-5, 9, 11, 13, and 16 under 35 U.S.C. §103(a):

The Office Action rejects claims 2-5, 9, 11, 13, and 16 under 35 U.S.C. §103(a) as being unpatentable over Miller in view Gunther and Piosenka and further in view of U.S. Patent No. 6,098,030 of McMinn (hereinafter “McMinn”) Applicants respectively traverse this rejection on the basis of the following arguments and further contend that neither Miller nor Gunther nor Piosenka nor McMinn alone or any combination, teach or suggest all elements of these claims as described below, and hence, does not anticipate the claimed invention.

Claims 2-5, 9, 11, 13, and 16 depend, either directly or indirectly, from independent Claim 1 and thereby incorporate the patentable features of Claim 1.

McMinn describes an integrated circuit which includes a temperature modeling circuit for reducing operational activity of the integrated circuit when its operating temperature exceeds a predefined threshold. McMinn discloses that an integrated circuit includes a plurality of sub circuits A -C, an operational activity control circuit, and a temperature modeling circuit. The temperature modeling circuit of McMinn functions to model in real time the operating

temperatures of the integrated circuit. McMinn, like Miller, Gunther, and Piosenka fails to teach or suggest each and every element of the controller recited in Claim 1.

The Examiner cites McMinn as teaching or suggesting a number of buffers and providing a control circuit to thermally profile an integrated circuit in which temperature measurements and threshold temperatures are programmable. McMinn fails to bridge the factual deficiencies of the Miller patent in view of the Gunther reference and in further view of the Piosenka patent. McMinn like Miller and Gunther and Piosenka fails to teach or suggest a controller for monitoring a temperature of an integrated circuit that includes, amongst other features, a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by the comparator whether an over temperature condition in the integrated circuit exists. Consequently, Miller in view of Gunther and Piosenka and in further view of McMinn fail to establish a *prima facie* case of obviousness for use in rejecting Claims 2-5, 9, 11, 13, and 16 for none of the cited references, alone or in any combination, teach or suggest each and every element of Claim 1.

Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of claims 2-5, 9, 11, 13, and 16 under 35 U.S.C. §103(a).

C. Rejection of Claim 17 under 35 U.S.C. §103(a):

The Office Actions rejects Claim 17 as being unpatentable over Miller in view of Gunter and Piosenka and McMinn and further in view of U.S. Patent No. 5,873,053 of Pricer et al. (hereinafter “Pricer”). Applicants respectfully traverse this rejection on the basis of the following arguments and further contend that Miller in view of Gunther and Piosenka and McMinn and further in view of Pricer fails to teach or suggest all elements of this claim, as described below and hence does not render the claimed invention obviousness.

Claim 17 depends, either directly or indirectly, from Claim 1, and thereby incorporates the patentable features of Claim 1.

The Pricer reference teaches or suggests a single bit over temperature\under temperature output from a member of FETs fashioned as a thermal sensor. The Pricer reference fails to teach or suggest a controller for controlling a temperature of an integrated circuit that includes a comparator response logic as recited in Claim 1. The Pricer reference teaches various FET configurations to measure the temperature of an integrated circuit. Nevertheless, the Pricer

reference fails to teach or suggest a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by the comparator whether an over temperature condition in an integrated exists.

Accordingly, Pricer fails to bridge the factual gaps of Miller in view of Gunther, Piosenka, and McMinn, and therefore the cited references, either alone or in any combination fail to teach or suggest each and every element of Claim 17. Hence, Miller in view of Gunther and Piosenka and McMinn and further in view of Pricer fail to establish a *prima facie* case of obviousness for use in rejecting Claim 17. Accordingly, Applicants request the Examiner to reconsider and withdraw the rejection of Claim 17 under 35 U.S.C. §103(a).

D. Rejection of Claims 6, 10, 12, and 28 under 35 U.S.C. §103(a):

The Office Action rejects Claims 6, 10, 12 and 28 as being unpatentable over Miller in view of Gunther and Piosenka and further in view of McMinn and further in view of U.S. Patent No. 6,363, 490 of Senyk (hereinafter “Senyk”) and U.S. Patent No. 5,291,607 of Ristic et al (hereinafter “Ristic”). Applicants respectfully traverse this rejection on the basis of the following arguments and further contend that neither Miller nor Gunther nor Piosenka nor McMinn nor Senyk nor Ristic, alone or in any combination, teach or suggest each and every element of these claims as described below, and hence, does not render the claimed inventions obvious.

Claims 6, 10, 12, and 28 depend directly or indirectly upon Claim 1, and therefore incorporate the patentable features of Claim 1.

Senyk describes the use of a diode, or a passive device, as a temperature sensing device. Senyk also teaches a control circuit to compare the temperature sensed by the diode to a threshold temperature to determine whether the measured temperature exceeds a threshold. If a measured temperature exceeds a threshold the control circuit transmits an over temperature signal via a control line. The method of temperature comparison taught by Senyk may be executed by means of a polling algorithm or by comparison hardware.

The Ristic reference discloses a microprocessor having a monolithically integrated environmental sensor. The microprocessor of Ristic is shielded from an environmental signal by means of isolation which is specific to the type of sensor used, thereby allowing the sensor to be exposed to an environmental signal.

Senyk is cited for teaching and suggesting a controller that compares the temperature of a processor to a threshold, wherein the threshold is set by a buffer located external to the controller and for teaching a temperature sensing diode is located external to the controller.

Ristic is cited for teaching an interface to a microprocessor to enable the microprocessor to read output signals from a plurality of sensor cells.

Nonetheless, the Ristic reference fails to teach or suggest a controller for monitoring a temperature of an integrated circuit that includes, amongst other features, a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by the comparator whether an over temperature condition in the integrated circuit exists. Likewise, the Senyk patent fails to teach or suggest a controller for monitoring a temperature of an integrated circuit that includes, amongst other features, a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by a comparator whether an over temperature condition in the integrated circuit exists. Senyk is primarily concerned with a passive thermal sensor (i.e. a temperature sensing diode) and is not concerned with an *active* thermal sensor. The Ristic patent is concerned with a microprocessor shielded from the integrated environmental signal produced by the integrated environmental sensor to allow the sensor to be exposed to the environmental signal. Neither the Ristic patent nor the Senyk patent is concerned with a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by the comparator whether an over temperature condition in an integrated circuit exists.

Neither the cited Senyk patent nor the cited Ristic patent alone or in combination, bridge the factual deficiencies of Miller in view of Gunther and Piosenka and further in view of McMinn and therefore, the cited combination of references fails to teach or suggest each and every element of Claims 6, 10, 12, and 28. Accordingly, Applicants respectfully request Examiner to reconsider and withdraw the rejection of Claims 6, 10, 12, and 28 under 35 U.S.C. §103(a)

E. Rejection of Claim 29 under 35 U.S.C. §103(a):

The Office Action rejects Claim 29 as being unpatentable over Miller in view of Gunther and Piosenka and further in view of U.S. Patent No. 5,838,578 of Pippin (hereinafter “Pippin”). Applicants respectfully traverse this rejection on the basis of the following arguments and further

contend that neither Miller nor Gunther nor Piosenka nor Pippin, alone or in any combination, teach or suggest each and every element of this claim, as described below, and hence, does not detract from the patentability of the claimed invention.

Claim 29, depends directly or indirectly, from independent Claim 1, and thereby incorporates the patentable features of Claim 1.

Pippin discloses the thermal sensor of Gunther. See Figure 1 of Pippin and Figure 4 of Gunther. Pippin fails to teach or suggest a controller for monitoring a temperature of an integrated circuit that includes, amongst other features, a comparator response logic coupled to a comparator for determining in response to a comparison of a first value to a second value by the comparator whether an over temperature condition in the integrated circuit exists. Hence, neither Miller, nor Gunther nor Piosenka nor Pippin, alone, or in any combination, teach or suggest each and every element of Claim 29. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Claim 29 under 35 U.S.C. §103(a).

F. Rejections of Claims 30 and 31 under 35 U.S.C. §103(a):

The Office Action rejects Claims 30 and 31 under 35 U.S.C. §103(a) as being unpatentable over Miller in view of Piosenka. Applicants respectfully traverse this rejection on the basis of the following arguments and further content that neither Miller nor Piosenka, alone or in combination, teach or suggest each and every element of these claims, as described below, and hence does not detract from the patentability of the claimed invention.

Claim 31 depends from independent Claim 30, and therefore incorporates the patentable features of Claim 30.

Claim 30 recites a controller for monitoring die temperatures of an integrated circuit. The controller includes means for receiving a plurality of first values representative of a plurality of die temperatures of the integrated circuit and means for comparing the plurality of first values to a plurality of corresponding second values representative of a plurality of threshold values. The controller further includes means for determining whether an over temperature condition of the integrated circuit exists based on an output of the means for comparing.

The Miller patent describes a thermal management system for a portable ultrasound imaging device. The thermal management system of Miller includes a number of temperature sensors, preferably thermistors to monitor respective case temperatures of the components

forming the portable ultrasound imaging device. A thermal management controller periodically polls the temperature sensors during operation of the ultrasound imaging device according to a software polling routine stored in the thermal management controller. The thermal management system of Miller monitors the respective case temperatures of various system components, for example, a battery, a fan, and external surface of an encapsulating package that surrounds the *die* of the integrated circuit, and based on the monitored temperatures, performs a control methodology to cool the ultrasound system to maintain an external casing temperature below a required mandatory temperature. In this manner, the skin of patient not damaged due to excess heat when coming in contact with the ultrasound head of the imaging device.

The cited Piosenka patent teaches a tamper proof arrangement for an integrated circuit. The disclosed arrangement include a package and lid fabricated of heavy metals to prevent X radiation or infrared detection of circuit operations. Sensors and control circuitry are located on the integrated circuit die itself which detect increased temperature and radiation and clear or zeroize any sensitive information included within the integrated circuit device. The purpose of the tamperproof arrangement taught by the Piosenka patent is to protect sensitive and confidential information from unauthorized disclosure.

It is recognized by the Examiner, that the Miller reference does not teach or suggest monitoring of *die* temperatures of an integrated circuit, as recited by Claim 30. The Examiner looks to the Piosenka patent to cure the factual deficiency of the Miller patent in determining that the claims are obvious. The Piosenka patent describes a tamper proof arrangement for protecting an integrated circuit semiconductor device. The Piosenka patent teaches the use of thermal sensitive transistor devices which produce an output voltage proportional to a temperature to detect an attack on or tampering with the integrated circuit. The Piosenka patent teaches that there is likelihood that heat generated by an attack on the tamperproof integrated circuit would raise the temperature of a thermal sensitive transistor device. However, the Piosenka reference does not teach or suggest a *controller* for monitoring die temperatures of an integrated circuit. Hence, the Piosenka patent is not concerned with controlling a die temperature of the integrated circuit. Rather, Piosenka is concerned with detecting unauthorized intrusion to delete sensitive data.

Applicants submit that there is no motivation to combine the references in order to render the claims obvious. In determining whether a case of *prima facie* of obviousness exists, it is

necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claim substitution or other modification. The prior art must provide the motivation to make the change to its own teachings to arrive at the invention under rejection. That is, it is not sufficient that the prior art **could be** so modified; instead the prior art must teach or suggest that the prior art **should be** so modified.

Applicants respectfully submit that the Examiner has not adequately and sufficiently stated what her motivation is for combining the teachings of the Miller patent with the teachings of the Piosenka patent to render the claims obvious. The Examiner merely states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teachings of Piosenka in the invention of Miller in order to monitor and control die temperatures of a given integrated circuit.

Not notwithstanding this statement, Applicants respectfully disagree with the proposed combination. First, the Examiner's statement is merely conclusionary. Second, there is no teaching in either reference that provides a motivation or suggestion to combine the two references to render the claimed invention obvious. The Miller patent is concerned with heat generated by ultrasound system circuitry and an associated rechargeable battery to, in part, prevent an external casing surfacing temperature of an ultrasound head from increasing beyond a mandated temperature to avoid damaging a patient's skin. Miller is not concerned with monitoring die temperatures of an integrated circuit. Miller is concerned with avoidance of personal injury to a patient unlike the controller recited in Claim 30 for monitoring die temperatures of an integrated circuit.

Moreover, the temperature measured by the thermistors of Miller provides no indication of uneven heating of a die packaged in an integrated circuit and, as such, provides no indication of high temperature die locations, or "hot spots" corresponding to die locations experiencing, for example, a high workload. Hence, Miller is unable to manage and control die "hot spots". In contrast, the claimed controller is well suited to manage and control die "hot spots".

The Piosenka patent is concerned with destroying data should someone tamper with an integrated circuit. The Miller patent and the Piosenka patent do not seek to solve the same problems that are overcome by the claimed invention. In the present invention, the controller monitors a plurality of die temperatures in an integrated circuit to at least manage and control die "hot spots".

The prior art does not teach or suggest the claimed controller for monitoring die temperatures of an integrated circuit. Furthermore, because there is no motivation in either reference for one of ordinary skill in the art to use the temperature sensor described in Piosenka in the system of Miller, Applicants submit that the combination of references is in error. Therefore, the controller for monitoring die temperatures of an integrated circuit as recited in Claim 30 is patentable over the Miller patent and the Piosenka patent. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Claims 30 and 31 under 35 U.S.C. §103(a).

G. Rejections of Claims 35, 36, and 38 under 35 U.S.C. §103(a):

The Office Action rejects Claims 35, 36, and 38 under 35 U.S.C. §103(a) as being unpatentable over Miller in view of Piosenka. Applicants respectfully traverse this rejection on the basis of the following arguments and further content that neither Miller nor Piosenka, alone or in combination, teach or suggest each and every element of these claims, as described below, and hence does not detract from the patentability of the claimed invention.

Claim 36 and 38 depends from independent Claim 35, and therefore incorporates the patentable features of Claim 35.

Claim 35 recites a method for monitoring *die temperatures* of an integrated circuit. The method includes an act of receiving a plurality of first values representative of a plurality of *die temperatures* of the integrated circuit. The method further includes acts of comparing the plurality of first values to a plurality of corresponding second values representative of a plurality of threshold values and determining whether an over temperature condition of the integrated circuit exists based on an output of the means for comparing.

The Miller patent describes a thermal management system for a portable ultrasound imaging device. The thermal management system of Miller includes a number of temperature sensors, preferably thermistors to monitor respective case temperatures of the components forming the portable ultrasound imaging device. A thermal management controller periodically polls the temperature sensors during operation of the ultrasound imaging device according to a software polling routine stored in the thermal management controller. The thermal management system of Miller monitors the respective case temperatures of various system components, for example, a battery, a fan, and external surface of an encapsulating package that surrounds the *die*

of the integrated circuit, and based on the monitored temperatures, performs a control methodology to cool the ultrasound system to maintain an external casing temperature below a required mandatory temperature. In this manner, the skin of patient not damaged due to excess heat when coming in contact with the ultrasound head of the imaging device.

The cited Piosenka patent teaches a tamper proof arrangement for an integrated circuit. The disclosed arrangement include a package and lid fabricated of heavy metals to prevent X radiation or infrared detection of circuit operations. Sensors and control circuitry are located on the integrated circuit die itself which detect increased temperature and radiation and clear or zeroize any sensitive information included within the integrated circuit device. The purpose of the tamperproof arrangement taught by the Piosenka patent is to protect sensitive and confidential information from unauthorized disclosure.

It is recognized by the Examiner, that the Miller reference does not teach or suggest a step of receiving a plurality of first values representative of a plurality of *die* temperatures of an integrated circuit, as recited by Claim 35. The Examiner looks to the Piosenka patent to cure the factual deficiency of the Miller patent in determining that the claims are obvious. The Piosenka patent describes a tamper proof arrangement for protecting an integrated circuit semiconductor device. The Piosenka patent teaches the use of thermal sensitive transistor devices which produce an output voltage proportional to a temperature to detect an attack on or tampering with the integrated circuit. The Piosenka patent teaches that there is a likelihood that heat generated by an attack on the tamperproof integrated circuit would raise the temperature of a thermal sensitive transistor device. However, the Piosenka reference does not teach or suggest a step of determining whether an *over-temperature* condition of an integrated circuit exists based on a result of an act of comparing. Hence, the Piosenka patent is not concerned with controlling a die temperature of the integrated circuit. Rather, Piosenka is concerned with detecting unauthorized intrusion to delete sensitive data.

Applicants submit that there is no motivation to combine the references in order to render the claims obvious. In determining whether a case of *prima facie* of obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claim substitution or other modification. The prior art must provide the motivation to make the change to its own teachings to arrive at the invention

under rejection. That is, it is not sufficient that the prior art **could be** so modified; instead the prior art must teach or suggest that the prior art **should be** so modified.

Applicants respectfully submit that the Examiner has not adequately and sufficiently stated what her motivation is for combining the teachings of the Miller patent with the teachings of the Piosenka patent to render the claims obvious. The Examiner merely states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teachings of Piosenka in the invention of Miller in order to monitor and control die temperatures of a given integrated circuit.

Not notwithstanding this statement, Applicants respectfully disagree with the proposed combination. First, the Examiner's statement is merely conclusory. Second, there is no teaching in either reference that provides a motivation or suggestion to combine the two references to render the claimed invention obvious. The Miller patent is concerned with heat generated by ultrasound system circuitry and an associated rechargeable battery to, in part, prevent an external casing surfacing temperature of an ultrasound head from increasing beyond a mandated temperature to avoid damaging a patient's skin. Miller is not concerned with monitoring die temperatures of an integrated circuit. Miller is concerned with avoidance of personal injury to a patient unlike the method recited in Claim 35 for monitoring die temperatures of an integrated circuit.

Moreover, the temperature measured by the thermistors of Miller provides no indication of uneven heating of a die packaged in an integrated circuit and, as such, provides no indication of high temperature die locations, or "hot spots" corresponding to die locations experiencing, for example, a high workload. Hence, Miller is unable to manage and control die "hot spots". In contrast, the claimed method is well suited to manage and control die "hot spots".

The Piosenka patent is concerned with destroying data should someone tamper with an integrated circuit. The Miller patent and the Piosenka patent do not seek to solve the same problems that are overcome by the claimed invention. In the present invention, the method monitors a plurality of die temperatures in an integrated circuit to at least manage and control die "hot spots".

The prior art does not teach or suggest the claimed method for monitoring die temperatures of an integrated circuit. Furthermore, because there is no motivation in either reference for one of ordinary skill in the art to use the temperature sensor described in Piosenka

in the system of Miller, Applicants submit that the combination of references is in error. Therefore, the controller for monitoring die temperatures of an integrated circuit as recited in Claim 35 is patentable over the Miller patent and the Piosenka patent. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Claims 35, 36, and 38 under 35 U.S.C. §103(a).

H. Rejection of Claim 32 under 35 U.S.C. §103(a):

Claim 32 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Miller in view of Piosenka and further in view of Gunther. Applicants respectfully traverse this rejection in light of the following arguments and request the reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) for the following reasons.

Claim 32 depends, directly or indirectly, from independent Claim 30, and therefore, incorporates the patentable features of Claim 30.

Gunther is cited for teaching a means of digitally filtering an output of a thermal sensor before determining whether an over temperature condition of the integrated circuit exists. As discussed above and in the relation to the rejection of Claim 30, Miller in view of Piosenka, fails to teach or suggest the controller recited in Claim 30, from which Claim 32 depends. Gunther fails to bridge the factual deficiencies of Miller and Piosenka. The digital filtering of Gunther fails to teach or suggest a controller for monitoring die temperatures of an integrated circuit as recited in Claim 30. As such, Miller in view of Piosenka and further in view of Gunther does not teach or suggest the subject matter recited in Claims 32. Hence, Claim 32 is not rendered obvious by Miller in view of Piosenka in further view of Gunther. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Claim 32 under 35 U.S.C. §103(a).

I. Rejection of Claim 37 under 35 U.S.C. §103(a):

Claim 37 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Miller in view of Piosenka and further in view of Gunther. Applicants respectfully traverse this rejection in light of the following arguments and request the reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) for the following reasons.

Claim 37 depends, directly or indirectly, from independent Claim 35, and therefore, incorporates the patentable features of Claim 35.

Gunther is cited for teaching or suggesting an act of digitally filtering a result of comparing before an act of determining whether an over temperature condition of the integrated circuit exists. As discussed above and in the relation to the rejection of Claim 35, Miller in view of Piosenka, fails to teach or suggest the method recited in Claim 35, from which Claim 37 depends. Gunther fails to bridge the factual deficiencies of Miller and Piosenka. The digital filtering of Gunther fails to teach or suggest a method for monitoring die temperatures of an integrated circuit as recited in Claim 35. As such, Miller in view of Piosenka and further in view of Gunther does not teach or suggest the subject matter recited in Claims 37. Hence, Claim 37 is not rendered obvious by Miller in view of Piosenka in further view of Gunther. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Claim 37 under 35 U.S.C. §103(a).

J. Rejection of Claims 33 and 34 under 35 U.S.C. § 103(a):

The Office Action rejects Claims 33 and 34 as being unpatentable over Miller in view of Piosenka and further in view of Ristic. Applicants' respectfully traverse this rejection on the basis of the following arguments, and further contend that neither Miller nor Piosenka nor Ristic, alone or in any combination, teach or suggest each and every element of these claims, as described below and hence, does not detract from the patentability of the claimed invention.

Claims 33 and 34 depend, directly or indirectly from Claim 30 and thereby incorporate the patentable features of Claim 30.

Ristic like Miller and Piosenka fails to teach or suggest a *controller* for monitoring a temperature of an integrated circuit that includes means for receiving a plurality of first values representative of a plurality of die temperatures of an integrated circuit. Hence, neither Miller nor Piosenka nor Ristic, alone or in combination, teach or suggest each and every element of Claims 33 and 34, and therefore fail to establish a *prima facie* case of obviousness. Accordingly, Applicants' respectfully request the Examiner to reconsider and withdraw the rejection of Claims 33 and 34 under 35 U.S.C. § 103(a).

**CONCLUSION**

In view of the amendments and remarks set forth above, Applicants contend that this application is in condition for allowance. If the Examiner deems there are any remaining issues, we invite the Examiner to call the undersigned at (617) 227-7400.

Respectfully submitted,

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